

What Is Claimed Is:

1. An apparatus comprising:

an airfoil having an exterior surface;

5 a fluid inlet opening extending through the exterior surface of the airfoil;

a fluid outlet opening extending through the exterior surface of the airfoil;

a pump operatively connected to the fluid inlet opening and to the fluid outlet opening, the pump being configured and
10 adapted to draw fluid into the fluid inlet opening and to expel fluid from the fluid outlet opening; and

first and second valves, the first valve being operatively connected between the fluid inlet opening and the pump and the second valve being operatively connected between
15 the pump and the fluid outlet opening, the first valve being configured and adapted to allow fluid to be drawn into the airfoil through the fluid inlet opening via the pump and to prevent fluid from being expelled from the airfoil through the fluid inlet opening, the second valve being configured and
20 adapted to allow fluid to be expelled from the airfoil through the fluid outlet opening via the pump and to prevent fluid from being drawn into the airfoil through the fluid outlet opening.

2. An apparatus in accordance with claim 1 wherein the

apparatus is an aircraft that comprises a wing, and wherein the airfoil constitutes a portion of the wing.

3. An aircraft in accordance with claim 2 wherein the wing has a leading edge and a trailing edge that define opposite
5 top and bottom portions of the exterior surface of the airfoil, and wherein the fluid inlet opening and the fluid outlet opening each extend through the top portion of the exterior surface of the airfoil.

4. An aircraft in accordance with claim 3 wherein the
10 fluid inlet opening is positioned between the leading edge of the wing and the fluid outlet opening.

5. An apparatus in accordance with claim 1 wherein the first and second valves are one-way check valves.

6. A apparatus in accordance with claim 1 wherein the pump
15 comprises a member that partially bounds a fluid chamber and that is configured and adapted to reciprocate in a manner so as to increase and decrease the volume of the fluid chamber.

7. A method comprising:

providing an apparatus that comprises an airfoil and
20 first and second valves, the airfoil having an exterior surface, a fluid inlet opening, and a fluid outlet opening, the fluid inlet and outlet openings each extending through the

exterior surface of the airfoil;

intermittently drawing fluid into the airfoil from an environment external to the apparatus via the fluid inlet opening in manner defining a plurality of intake time

5 intervals separated by a plurality of non-intake time intervals;

utilizing the first valve to prevent expulsion of fluid from the airfoil via the fluid inlet opening during the non-intake intervals;

10 intermittently expelling fluid from the airfoil into the external environment via the fluid outlet opening in a manner defining a plurality of expulsion time intervals separated by a plurality of non-expulsion time intervals; and

utilizing the second valve to prevent fluid from
15 entering the airfoil via the fluid outlet opening during the non-expulsion intervals.

8. A method in accordance with claim 7 wherein the steps of intermittently drawing fluid into the airfoil and
20 intermittently expelling fluid from the airfoil occur in a manner such that the intake time intervals coincide with the non-expulsion time intervals and such that the non-intake time intervals coincide with the expulsion time intervals.

9. A method in accordance with claim 7 wherein the step of providing the apparatus occurs in a manner such that the apparatus further comprises a pump that is operatively connected to the fluid inlet opening and to the fluid outlet opening, and wherein the method further comprises utilizing the pump to perform the steps of intermittently drawing fluid into the airfoil from the external environment via the fluid inlet opening and intermittently expelling fluid from the airfoil into the external environment via the fluid outlet opening.

10. A method in accordance with claim 9 wherein the step of providing the apparatus occurs in a manner such that the pump comprises a member that partially bounds a fluid chamber, and wherein the step of utilizing the pump to perform the steps of intermittently drawing fluid into the airfoil from the external environment via the fluid inlet opening and intermittently expelling fluid from the airfoil into the external environment via the fluid outlet opening comprises reciprocating the member of the pump in a manner causing the volume of the fluid chamber to increase and then decrease in a repetitive manner.

11. A method in accordance with claim 7 wherein the step of intermittently drawing fluid into the airfoil from an

environment external to the apparatus via the fluid inlet opening occurs in a manner such that at least one-hundred intake time intervals occur within one second.

12. A method in accordance with claim 7 wherein the step
5 of providing the apparatus occurs in a manner such that the airfoil has a leading edge and a trailing edge that define opposite top and bottom portions of the exterior surface of the airfoil, and wherein the steps of intermittently drawing fluid into the airfoil and intermittently expelling fluid from
10 the airfoil occur in a manner such that fluid is drawn into and expelled through the top portion of the exterior surface of the airfoil.

13. A method in accordance with claim 12 wherein the step of providing the apparatus occurs in a manner such that
15 the fluid inlet opening is positioned between the leading edge of the airfoil and the fluid outlet opening.

14. A method comprising:

providing an apparatus having an airfoil, separate fluid inlet and fluid outlet openings, and a valve, the
20 airfoil having an exterior surface and a fluid passageway, the fluid inlet opening and the fluid outlet opening each extending through the exterior surface of the airfoil, the valve being movable between opened and closed positions, the

valve being configured and adapted to prevent fluid from flowing through the fluid inlet opening when in its closed position and to allow fluid to flow through the fluid inlet opening when in its opened position;

5 drawing fluid into the fluid passageway of the airfoil from an environment external to the apparatus via the fluid inlet opening, the drawing of fluid into the fluid passageway via the fluid inlet opening occurring with the valve in its opened position;

10 expelling fluid from the fluid passageway of the airfoil into the external environment via the fluid outlet opening, the expelling of fluid from the fluid passageway via the fluid outlet opening occurring with the valve in its closed position.

15 15. A method in accordance with claim 14 wherein the step of providing the apparatus occurs in a manner such that the valve constitutes a first valve and wherein the such that the apparatus further comprises a second valve, the second valve being movable between opened and closed positions and
20 being configured and adapted to prevent fluid from flowing through the fluid outlet opening when in its closed position and to allow fluid to flow through the fluid outlet opening when in its opened position, the step of drawing fluid into the fluid passageway occurring with the second valve in its

closed position and the step of expelling fluid from the fluid passageway occurring with the second valve in its opened position.

16. A method in accordance with claim 15 further
5 comprising a step of cycling each of the first and second valves between their opened and closed positions at a rate of at least one-hundred Hertz.

17. A method in accordance with claim 16 wherein the step of cycling each of the first and second valves between
10 their opened and closed positions is performed by creating pressure differentials that cause the first and second valves to move between their opened and closed positions.

18. A method in accordance with claim 14 wherein the step of providing the apparatus occurs in a manner such that
15 the apparatus further comprises a reciprocating member, and wherein the steps of drawing fluid into the fluid passageway and expelling fluid from the fluid passageway occur via reciprocation of the reciprocating member.

19. A method in accordance with claim 14 wherein the
20 apparatus is an aircraft and wherein the step of providing the aircraft occurs in a manner such that the airfoil has a leading edge and a trailing edge that define opposite top and bottom portions of the exterior surface of the airfoil, and

wherein the steps of drawing fluid into the fluid passageway and expelling fluid from the fluid passageway occur in a manner such that fluid is drawn into and expelled through the top portion of the exterior surface of the airfoil.

- 5 20. A method in accordance with claim 19 wherein the step of providing the aircraft occurs in a manner such that the fluid inlet opening is positioned between the leading edge of the airfoil and the fluid outlet opening.